

ABSTRACT

With regard to a solid polymer-based fuel cell, an electrolyte membrane for conducting proton between a fuel electrode and an air electrode is conventionally made from a material obtained by chemically modifying a hollow fullerene such as  $C_{60}$  by means of a proton dissociable group. However, this fuel cell poses a following problem: since the proton conductivity of the membrane is so low that the internal resistance of battery is increased, which, when big current is extracted, causes the electromotive force to be reduced. The electrolyte membrane is made of a material obtained by chemically modifying an endohedral fullerene doped with an atom whose electronegativity is equal to or higher than 3, by means of a proton dissociable group, or a material made from an endohedral fullerene doped with an atom whose electronegativity is equal to or lower than 1. The membrane ensures the improved proton conductivity and reduced internal resistance of battery, as compared with the conventional electrolyte membrane made from a material obtained by chemically modifying a hollow fullerene by means of a proton dissociable group.